

WHAT IS CLAIMED IS:

1. A FBAR device comprising:

a substrate structure provided with an upper surface;

5 a seed layer formed on the upper surface of the substrate structure and made of one selected from gold (Au) and titanium (Ti); and

one or more acoustic resonant portions, each including a lower electrode film formed on the seed layer and made of
10 molybdenum (Mo), a piezoelectric layer formed on the lower electrode film and made of aluminum nitride (AlN), and an upper electrode film formed on the piezoelectric layer.

2. The FBAR device as set forth in claim 1,

15 further comprising a layer made of tantalum (Ta) and formed between the seed layer and the substrate structure in case that the seed layer is made of Au.

3. The FBAR device as set forth in claim 1,

20 wherein the upper electrode film is made of Mo.

4. The FBAR device as set forth in claim 1,

wherein the substrate structure is a substrate provided with air gaps formed on its upper surface.

5. The FBAR device as set forth in claim 4,

wherein the acoustic resonant portions are plural in number, and the air gaps are formed on the substrate at positions corresponding to each of the acoustic resonant portions.

6. The FBAR device as set forth in claim 1,

wherein the substrate structure includes a substrate provided with a flat upper surface, and a membrane layer provided with an air gap formed on the upper surface of the substrate.

7. The FBAR device as set forth in claim 1,

wherein the substrate structure includes a substrate provided with a flat upper surface, a membrane support layer formed on the upper surface of the substrate so that an air gap is surrounded by the membrane support layer, and a membrane layer formed on the upper surface of the membrane support layer so that the air gap is covered by the membrane layer.

8. The FBAR device as set forth in claim 6 or 7,

wherein the membrane layer is made of a silicon nitride or a silicon oxide.

9. The FBAR device as set forth in claim 1,
wherein the substrate structure is a reflective layer in
which two or more layers with different impedances are
alternately stacked.

5

10. A method for producing a FBAR device comprising the
steps of:

(a) preparing a substrate structure provided with an
upper surface;

10 (b) forming a seed layer made of one selected from gold
(Au) and titanium (Ti) on the upper surface of the substrate
structure; and

15 (c) forming one or more acoustic resonant portions by
sequentially stacking a lower electrode film formed on the
seed layer and made of molybdenum (Mo), a piezoelectric layer
formed on the lower electrode film and made of aluminum
nitride (AlN), and an upper electrode film formed on the
piezoelectric layer.

20 11. The method for producing a FBAR device as set forth
in claim 10,

further comprising the step of (b') forming a layer made of
tantalum (Ta) on the substrate structure before the step (b)
in case that the seed layer is made of Au.

25

12. The method for producing a FBAR device as set forth in claim 10,

wherein the upper electrode film is made of Mo.

5 13. The method for producing a FBAR device as set forth in claim 10, wherein:

the step (a) includes:

(a-1) preparing a substrate;

10 (a-2) forming a cavity on the upper surface of the substrate; and

(a-3) forming a sacrificial layer on the cavity so that the upper surface of the substrate is flat; and

15 the method further comprises, after the step (c), the step of (d) removing the sacrificial layer so as to form an air gap.

14. The method for producing a FBAR device as set forth in claim 13, wherein:

a plurality of cavities are formed in the step (a-2); and

20 a plurality of acoustic resonant portions are formed on the upper surface of the substrate so that the acoustic resonant portions correspond to sacrificial layer forming positions in the step (c).

25 15. The method for producing a FBAR device as set forth

in claim 10, wherein:

the step (a) includes:

(a-1) providing a substrate with a flat upper surface;

(a-2) forming a sacrificial layer on the upper surface of
5 the substrate at positions of the acoustic resonant portions;
and

(a-3) forming a membrane layer on the substrate so that
the sacrificial layer on the substrate is covered by the
membrane layer; and

10 the method further comprises, after the step (c), the
step of (d) removing the sacrificial layer so as to form an
air gap.

16. The method for producing a FBAR device as set forth
15 in claim 10, wherein:

the step (a) includes:

(a-1) providing a substrate with a flat upper surface;

(a-2) forming a sacrificial layer on the upper surface of
the substrate at positions of the acoustic resonant portions;
20 and

(a-3) forming a membrane support layer on the upper
surface of the substrate so that the sacrificial layer is
surrounded by the membrane support layer; and

(a-4) forming a membrane layer on the membrane support
25 layer and the sacrificial layer; and

the method further comprises, after the step (c), the step of (d) removing the sacrificial layer so as to form an air gap.

5 17. The method for producing a FBAR device as set forth in claim 15,

 wherein the membrane layer is made of a silicon nitride or a silicon oxide.